Weather and Seasons
Lesson 2d: Temperatures Can Change from Month to Month

Grade: Kindergarten	**Length of lesson:** 35 minutes	**Placement of lesson in unit:** 2d of 5 lessons on weather

Unit central questions: Is weather the same everywhere all of the time? How do you know?	**Lesson focus questions:** How did our temperature pattern change from September to January? What is our evidence?

Main learning goal: Temperature patterns can change from one month to another month.

Science content storyline: We can use weather data to make graphs that help us identify weather and temperature patterns at a given time in a specific place. These patterns describe a variety of conditions (sunny, cloudy, rainy or snowy, windy, hot or cold). In this lesson, we examined how temperature patterns change from one month to another month. By comparing our bar graphs for September and January, we discovered that the temperature pattern in Pomona changed from one month to another. Temperatures are warmer in September and cooler in January.

Ideal student response to the focus questions: Temperature patterns can change from one month to another month. Our bar graphs showed that the temperature pattern in Pomona was warmer in September and cooler in January.

Preparation

Materials Needed
- Science notebooks
- Chart paper and markers
- Large class weather calendars for September and January

Student Handouts
- 1.1 Monthly Weather Observation Chart (from lesson 1b)
- 1.2 Pomona Weather Patterns for September (from lesson 1b)
- 1.4 Pomona Temperature Patterns for September (from lesson 1c)
- 2.1 Pomona Weather Patterns for January (from lesson 2a)
- 2.3 Pomona Temperature Patterns for January (from lesson 2c)
- 2.4 Pomona Temperature Patterns (2 worksheets per page; 1 per student)

Ahead of Time
- Review the content background document.
- Handout 2.4 (Pomona Temperature Patterns) has two worksheets per page, so you'll need to cut it in half and give each student one worksheet.
- Display the class weather calendars from September and January side by side. These months should vary as much as possible.
- Review the PowerPoint slide and modify as needed. *Pay special attention to slides 2, 4, 6, and 11. They should reflect the actual temperature and weather patterns your class observed.*
- **ELL support:** Meet with ELL students in advance and introduce them to the lesson content, structure, materials, and activities so they know what's expected and can participate more fully during the lesson. Identify vocabulary terms in the lesson plan to review with students in advance, including *temperature, thermometer*, *bar/picture graph*, *weather pattern*, *calendar*, *count*, *evidence*, and *compare*.
- **Students will need their completed temperature bar graphs for January (handout 2.3).** They'll use this graph again in lesson 4b to compare temperatures in Pomona and Detroit in January.

Lesson 2d General Outline

Time	Phase of Lesson	How the Science Content Storyline Develops
5 min	**Link to previous lesson:** The teacher engages students in reviewing the temperature patterns they identified on their bar graphs for January.	• Using our weather data to make a bar graph can help us identify temperature patterns more easily and provides us with more accurate evidence. These patterns can include hot, warm, cool, or cold temperatures.
1 min	**Lesson focus questions:** The teacher introduces the focus questions, *How did our temperature pattern change from September to January? What is our evidence?*	
5 min	**Setup for activity:** Students review the temperature pattern for September on their bar graphs and predict whether the pattern for January is the same or different.	• Using our observation charts and bar graphs, we can compare weather data from different months to see if temperature patterns change from month to month.
8 min	**Activity:** Working in pairs, students compare their bar graphs from January and September to see whether the temperature patterns are the same or different. Then they share their findings in a class discussion.	• Using our observation charts and bar graphs, we can compare weather data from different months to see if temperature patterns change from month to month. • Our bar graphs showed that temperature patterns can change from one month to another month. Some months have warmer temperatures, while other months tend to be cooler.
8 min	**Follow-up to activity:** The teacher reviews the focus question, and students answer it using evidence from their bar graphs for September and January. Then they use this evidence to help them decide which month had more hot/warm or cool/cold days.	• Using our observation charts and bar graphs, we can compare weather data from different months to see if temperature patterns change from month to month. • Our bar graphs showed that temperature patterns can change from one month to another month. Some months have warmer temperatures, while other months tend to be cooler. In Pomona, the temperature pattern is warmer in September and cooler in January. We can find evidence of these changes by comparing the weather data on our observation charts and bar graphs.
6 min	**Synthesize/summarize today's lesson:** The teacher engages students in summarizing how weather and temperature patterns can change from month to month.	
		• Weather patterns can also change from month to month. Some months can have more cloud and rainy days, while other months can have more sunny days.
2 min	**Link to next lesson:** The teacher announces that in the next lesson, students will explore how weather changes during the day.	

Time	Phase of Lesson and How the Science Content Storyline Develops	STeLLA Strategy	Teacher Talk and Questions	Anticipated Student Responses	Possible Probe/Challenge Questions
5 min	**Link to Previous Lesson** **Synopsis:** The teacher engages students in reviewing the temperature patterns they identified on their bar graphs for January. **Main science idea(s):** • Using our weather data to make a bar graph can help us identify temperature patterns more easily and provides us with more accurate evidence. These patterns can include hot, warm, cool, or cold temperatures.	Ask questions to elicit student ideas and predictions. Engage students in analyzing and interpreting data and observations.	**Show slides 1 and 2.** Last time, we made bar graphs to help us see patterns in our temperatures during January. What temperature patterns did we find on our graphs? **NOTE TO TEACHER:** *Have students take out their temperature bar graphs for January (handout 2.3) from lesson 2c. Ideally, it would be better to replace the bar graph on slide 2 with an actual completed bar graph that reflects students' work in the previous lesson.* How many cool and cold days did we have if we add them all together? What other temperature patterns did you see on your bar graph? How many warm and hot days did we have if we add them together?	January had more cool days than warm days. There were *[10]* cool days, and only *[five]* warm days. There were *[five]* cold days. There were *[15]* cool and cold days! There were only *[five]* warm days! We didn't have any hot days. *[Five]*, because there weren't any	Show us the evidence on your graph. And how many cold days did we have? That was a lot, wasn't it?

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				hot days.	So which is more—[15] cool and cold days or [five] warm and hot days?
			What does that tell us about the temperature pattern in January? Start your sentence with "The temperature pattern in January was …."	[Fifteen] is more than [five].	
				The temperature pattern in January was mostly cool.	
			So do we all agree that the temperature pattern in January was mostly cool?	Yes.	
			Why do you think we made a bar graph of our temperatures?	It's what scientists do.	
				So we can be like scientists.	But why do scientists make graphs?
				It helps us see patterns easier.	
				It's evidence.	
			That's right! Bar graphs help us see temperature patterns more easily. We can also use bar graphs as evidence to support our ideas about what the temperatures were mostly like in January.		
1 min	**Lesson Focus Questions**		**Show slide 3.**		

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	Synopsis: The teacher introduces the focus questions, *How did our temperature pattern change from September to January? What is our evidence?*	Set the purpose with a <u>focus question</u> or goal statement.	Today we'll think about whether the temperature patterns in January and September are the same or different. To help us figure this out, we're going to compare our bar graphs for these two months. Our focus questions for today are *How did our temperature pattern change from September to January? What is our evidence?* **NOTE TO TEACHER:** *Write the focus questions on the board and draw a box around them.*		
		Ask questions to elicit student ideas and predictions. Ask questions to probe student ideas and predictions.	What evidence can we use to help us figure out if our temperature pattern changed from September to January? What can we look at?	We can use our weather calendars for September and January. Our calendars show the temperatures we wrote down every day. We can look at our bar graphs for January and September? Because they show	How will looking at our class weather calendars help us? What other evidence can we look at? How will our bar graphs help us?

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				how many days were hot and warm or cool and cold for each month.	
			So we can use evidence from our class weather calendars and our graphs for September and January to help us figure out if the temperature pattern changed from one month to the other.		
5 min	**Setup for Activity** **Synopsis:** Students review the temperature pattern for September on their bar graphs and predict whether the pattern for January is the same or different. **Main science idea(s):** • Using our observation charts and bar graphs, we can compare weather data from different months to see if temperature patterns change from month to month.	Select content representations and models matched to the learning goal and engage students in their use. Ask questions to elicit student ideas and predictions. Ask questions to probe	**NOTE TO TEACHER:** *Have students take out their temperature bar graphs for September (handout 1.4) from lesson 1c. You might also want to replace the bar graph on slide 4 with an actual completed bar graph that reflects students' work.* **Show slide 4.** To help us remember our temperatures way back in September, let's look at the bar graphs we made. What pattern did we see on our graphs for hot and warm days in September? What pattern did we see on our graphs for cool and	There were lots of hot and warm days in September. *[Nineteen!]*	How many hot and warm days did we have in September if we add them together? That was a lot of warm and hot days, wasn't it?

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		student ideas and predictions. Engage students in communicating in scientific ways.	cold days in September? So our graphs showed a temperature pattern of mostly hot and warm days in September. **Show slide 5.** Do you think the temperature patterns in September and January are the same or different? Use the sentence starter on the slide when you share your ideas: *I think the temperature patterns in September and January are [the same/different] because …* **NOTE TO TEACHER:** *Encourage students to respond to each other's ideas by agreeing or disagreeing, asking questions, or adding on.* **ELL support:** It might be helpful for ELL students to share their ideas with a same-language partner first so they can participate more fully in the class discussion.	There was only *[one]* cool day. There were *[no]* cold days! I think it's pretty much the same in January and September. The temperature pattern. I think the temperature pattern is the same because it was still sunny in January, so it was still warm. I think the temperature	That wasn't very many, was it? What do you mean by "it"? Why do you think that? Any other ideas?

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				patterns are different because it was colder in January than in September.	Why do you think it was colder in January?
				Because I had to wear a jacket.	
				We wore T-shirts and shorts in September.	So do you think it was hotter in September than it was in January?
				I think it was sunnier, so it was hotter in September.	
				The temperature pattern.	What do you mean by "it"?
		Make explicit links between science ideas and activities **before** the activity.	You've shared some interesting ideas about how the temperature patterns might be different in September and January! Now let's compare our bar graphs and see what patterns we can find. Make sure you have your bar graphs for September and January out on your desks. **NOTE TO TEACHER:** *Give students time to*		

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			locate their temperature bar graphs for September and January (handouts 1.4 and 2.3).		
8 min	**Activity** **Synopsis:** Working in pairs, students compare their bar graphs from January and September to see whether the temperature patterns are the same or different. Then they share their findings in a class discussion. **Main science idea(s):** • Using our observation charts and bar graphs, we can compare weather data from different months to see if temperature patterns change from month to month. • Our bar graphs showed that temperature patterns can change from one month to another month. Some months have warmer temperatures, while other months tend to be cooler.	Select content representations and models matched to the learning goal and engage students in their use. Highlight key science ideas and focus question throughout.	**NOTE TO TEACHER:** *It would be ideal if you replace the graphs on slide 6 with actual bar graphs from September and January that reflect your own students' work. Also display the class bar graphs you made during lessons 1c and 2c side by side.* *If students haven't yet counted and graphed windy days for September and January using the data from the class weather calendars, have them do so during this activity so they can compare their graphs. Also make sure that students record the number of windy days for both months on their Monthly Weather Observation Charts.* **Show slide 6.** I've placed our bar graphs for September and January side by side so we can compare the temperature patterns we found. You can put your two bar graphs side by side on your desks too. Before we look for patterns, who can tell me what a pattern is? Right! A *pattern* is something that happens again and again. And what is a *temperature* pattern?	Something that happens again and again. A temperature pattern is what the temperature is like most of the time.	

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		Make explicit links between science ideas and activities **during** the activity.	Yes. A *temperature pattern* is what the temperature is like most of the time. When you look at our two graphs, do you see any temperature patterns that are the same or different? **Turn and Talk:** Turn to your elbow partner and look at your bar graphs together. See if you can find any temperature patterns for September and January that are the same or different. Be ready to share your ideas with the class. **Show slide 7.**		
		Engage students in analyzing and interpreting data and observations. Engage students in communicating in scientific ways. Ask questions to probe student ideas and predictions.	**Whole-class discussion:** Now let's hear what you noticed when you compared your bar graphs for September and January. Use one of the sentence starters on the slide: *A temperature pattern I see is …* Or *One pattern I notice is …* **NOTE TO TEACHER:** *As students share their observations, record them on chart paper as a reference point for future discussions.*	The highest bar is for warm days. A pattern I noticed is that the highest bar is for warm days.	Please start your sentence with "A pattern I noticed is …." Does that tell us what the

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		Ask questions to challenge student thinking.			temperature is like most of the time in September and January? Try your sentence again and talk about September and January.
				A pattern I noticed is that the highest bar is for warm days in September. That means it was warmer in September than January.	
					That's a great comparison of the patterns.
			What other temperature patterns do you see for September and January that are the same or different?	One pattern we noticed is that January had more cool and cold days than September.	
					How do you know that? What is your evidence?
				Our evidence is that there were *[15]* cool and cold days in January, and only *[one]* cool day in September.	

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		Summarize key science ideas.	So one temperature pattern we noticed is that there were more cool and cold days in January than in September. Did you notice any other temperature patterns when you compared the two graphs?	There were lots and lots of warm and hot days in September and only a few warm days in January. Our graphs show that there were *[19]* warm and hot days in September. There were only *[five]* warm days in January and *[no]* hot days. *[Nineteen]* is lots more than	Tell us what you mean by "lots and lots." How many warm and hot days were there in September? What is your evidence? How many warm and hot days were there in January? So which is more—*[19 or five]*?

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			OK. So another temperature pattern we noticed on our graphs is that there were more warm and hot days in September than in January.	*[five]*!	
8 min	**Follow-Up to Activity** **Synopsis:** The teacher reviews the focus question, and students answer it based on evidence from their bar graphs for September and January. Then they use this evidence to help them decide which month had more hot/warm or cool/cold days. **Main science idea(s):** • Using our observation charts and bar graphs, we can compare weather data from different months to see if temperature patterns change from month to month. • Our bar graphs showed that temperature patterns can change from one month to another month. Some months have warmer temperatures, while	Highlight key science ideas and focus question throughout. Make explicit links between science ideas and activities **after** the activity.	**Show slide 8.** Today's focus questions are *How did our temperature pattern change from September to January? What is our evidence?* What have we learned about the temperatures in September and January that can help us answer this question? Let's look at our bar graphs again. Are the temperature patterns in September and January the same or different?	They're different! The warm and hot column on our graph was really tall for September. The warm and hot column was really short for January.	What is your evidence? And what was it like in January? And what did you notice about the cool and cold columns for September and January?

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	other months tend to be cooler. In Pomona, the temperature pattern is warmer in September and cooler in January. We can find evidence of these changes by comparing the weather data on our observation charts and bar graphs. • Weather patterns can also change from month to month. Some months can have more cloud and rainy days, while other months can have more sunny days.	Select content representations and models matched to the learning goal and engage students in their use. Engage students in analyzing and interpreting data and observations. Engage students in constructing explanations and arguments.	Did you notice any other temperature patterns when you compared your graphs? **Show slide 9.** Next, let's write down what we decided about the temperature patterns in September and January. **NOTE TO TEACHER:** *Distribute handout 2.4 (Pomona Temperature Patterns) and direct students to paste it in their science notebook. Then orient students to the handout and review how to complete it.* Let's look at the first sentence on the handout together. What did we decide about September? So which thermometers will you circle in that first row for September?	The cool and cold column was really tall for January and really short for September. September had more warm and hot days. September had *[19]* warm and hot days, and January had only *[five]* warm days and *[no]* hot days. The red and yellow thermometers.	 What's your evidence?

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			Who can complete the first sentence for us about September temperatures?	September had more hot and warm days.	
			Now let's work on the second sentence. What temperature pattern did we find for January?	January had more cool and cold days. January had *[15]* cool and cold days, and September had only *[one]* cool day and *[no]* cold days.	What's your evidence?
			So which thermometers will you circle in that second row for January?	The green and blue ones.	
			Who can complete the second sentence for us about January temperatures?	January had more cool and cold days.	
			Now I want you to write or draw your evidence on the handout. First, let's read the sentences together. Be ready to tell us about the evidence you have that supports our ideas about the temperature patterns in September and January. **NOTE TO TEACHER:** *Circulate around the room as students work on the task and provide support as needed. You could have students talk about their evidence with a partner before writing or drawing it on their handouts.*		

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		Engage students in communicating in scientific ways.	**Whole-class share-out:** Let's hear your evidence for the temperature patterns we identified for September and January. First read the two sentences on your handout and then tell us about your evidence. Listen carefully as your classmates share their evidence, and think about whether you agree or disagree and why. Be ready to ask questions and add your own ideas and evidence, too. **NOTE TO TEACHER:** *As students share their evidence, display their handouts on a document reader. Record their evidence on chart paper during this discussion.*	September had more hot and warm days. January had more cool and cold days. Our evidence is our bar graphs. I agree but I want to add on. The graphs shows that September had *[19]* hot and warm days, and January had only *[five]* warm days and *[no]* hot days. Our graphs show that January had more cool and cold days than	Does anyone agree or disagree or want to add on? What about your evidence for cool and cold days?

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				September.	Does anyone want to ask a question or add on?
				I want to ask a question. How many cool and cold days were in each month?	
					Good question! Who can tell us the number of cool and cold days in September and January?
				January had *[15]* cool and cold days, and September had only *[one]* cool day and *[no]* cold days.	
			So we found evidence on our graphs to support our idea that September and January have different temperature patterns. **Show slide 10.** Our evidence shows that September is warmer than January because there were more hot and warm days in September, and January is cooler than September because there were more cool and cold days in January.		
		Highlight key science ideas	How would you answer our focus question now? *How did our temperature pattern change from*		

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		and focus question throughout.	*September to January?*	The temperature pattern changed from warmer in September to cooler in January.	
6 min	**Synthesize/Summarize Today's Lesson** **Synopsis:** The teacher engages students in summarizing how weather and temperature patterns can change from month to month. **Main science idea(s):** • Using our observation charts and bar graphs, we can compare weather data from different months to see if temperature patterns change from month to month. • Our bar graphs showed that temperature patterns can change from one month to another month. Some months have warmer temperatures, while other months tend to be cooler. In Pomona, the temperature pattern is	Engage students in making connections by synthesizing and summarizing key science ideas.	We have a lot of weather information about September and January, don't we? We have our class weather calendars and our Monthly Weather Observation Charts. We have our picture graphs showing how many days were sunny, cloudy, rainy, and windy in September and January. And we have our temperature graphs for both months that show how many days were hot and warm or cool and cold. Let's review what we've learned so far about how our weather in Pomona is different in September and January. **Show slide 11.** Open your notebooks to your Monthly Weather Observation Charts. **NOTE TO TEACHER:** *Give students time to find their observation charts (handout 1.1) in their notebooks. It would be ideal if you replace the charts on slide 11 with actual weather charts from September and January that reflect your students' work.*		

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	warmer in September and cooler in January. We can find evidence of these changes by comparing the weather data on our observation charts and bar graphs. • Weather patterns can also change from month to month. Some months can have more cloud and rainy days, while other months can have more sunny days.		Look at the number of sunny days you wrote down for September and January. Which month had more sunny days? And which month had more cloudy days? What about rainy days? Which month had more rain? And which month was hotter than the other?	September. Our chart says that September had *[13]* sunny days, and January had *[10]*. January. Our chart says that there were *[two]* cloudy days in September and *[seven]* cloudy days in January. Both months had the same amount of rain. Our chart shows that there were *[three]* rainy days in September and January. September was	What evidence do you have? What's your evidence? What evidence do you have?

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				way hotter than January. Our chart shows that there were *[nine]* hot days in September, and there were *[no]* hot days in January.	What's your evidence?
			NOTE TO TEACHER: *If students already counted and graphed windy days, compare this data as well.* You did a great job using the evidence on our observation charts to show the differences between September and January! So based on our evidence, do you think the weather is the same or different from one month to the next? Why? **NOTE TO TEACHER:** *Encourage students to respond to each other's ideas during this discussion. Make sure to ask students why they think the weather is the same or different from month to month.*	I think it mostly changes. Because our graphs showed that the weather changed from September to January. But sometimes it can be the same.	Why do you think it mostly changes? Does anyone agree, disagree, or want to add on?

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				Like September and January both had *[three]* rainy days. I think January was very different from September, especially the temperatures.	Any other ideas?
		Summarize key science ideas.	OK. Now let's summarize what we've learned about weather patterns so far. **Show slide 12.** First, we know that if we study our weather over time, we can notice patterns. What can help us see weather patterns more clearly and easily? **Show slide 13.** Right! Graphs help us see weather patterns more easily. For example, our bar graphs helped us see temperature patterns. And comparing our bar graphs helped us see how temperature patterns can change from one month to another month. **Show slide 14.** Besides temperatures, what other weather patterns can change from month to month? What kinds of weather do you see on this slide? Right, all of these weather conditions can change	Picture/bar graphs. Sun, wind, snow, clouds, and rain.	

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			from month to month.		
			What weather patterns for September and January did our picture graphs help us see? Look at your picture graphs for ideas.	There were more sunny days in September than in January. It got cloudier in January.	
			Show slide 15. So based on our picture graphs, we know that weather patterns can change from month to month. For example, our picture graphs showed us that September was mostly sunny, and January was sunny and cloudy. Why do you think it's important for us to know that weather patterns change from one month to the next? How does this help us? **NOTE TO TEACHER:** *Emphasize why it's important for people to know that weather patterns can change from month to month.* That's right! If we know that weather patterns can change from month to month, and we know what	It helps us know what to wear outside. It helps people know what they can do outside. It helps farmers know when to plant their crops.	

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			those patterns are, we can plan better. It helps us know whether to wear jackets or T-shirts to school, and it helps people know what they can do outside and when they can do certain things.		
2 min	**Link to Next Lesson** **Synopsis:** The teacher announces that in the next lesson, students will explore how weather changes during the day.	Link science ideas to other science ideas.	**Show slide 16.** In our next lesson, we'll keep thinking about how weather patterns change, but this time we'll explore how weather changes during the day. Have you ever noticed the weather change during the day? How did it change? **NOTE TO TEACHER:** *Be sure to save students' completed temperature bar graphs (handout 2.3), since students will use them again in lesson 4b.*	I've seen the weather change from sunny to cloudy during the day. I've seen the weather get really windy all of a sudden!	